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Buc 109
Attorney for Applicant

PATENT

Docket No. SJ0920010058US1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Tsann Lin, et al.

Serial No.: 10/066,835

Filed: February 4, 2002

For: *IN-SITU* OXIDIZED FILMS FOR USE AS GAP
LAYERS FOR A SPIN-VALVE SENSOR AND
METHODS OF MANUFACTURE

Examiner: Kevin M. Bernatz

Group Art
Unit: 1773

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DECLARATION UNDER 37 C.F.R. §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Tsann Lin, declare as follows:

1. I am an employee of Hitachi Global Storage Technologies, Inc. (Hitachi).
2. I am a former employee of a department of IBM which has been sold to Hitachi.
3. I am familiar with the contents and subject matter of the above-identified patent application having Serial Number 10/066,835 now owned by Hitachi.
4. I am a co-inventor with Daniele Mauri of the invention which is the subject of the above-identified patent application.
5. It is my understanding that United States Patent Application Publication number 09/748,207 by Sasaki et al. (hereinafter "Sasaki") has been cited in an Office Action by the

U.S. Patent and Trademark Office.

6. I assert that the gap layer of the above-identified patent application is formed by a process of forming successive metallic layers that are *in-situ* oxidized. Pure Al is deposited using Physical Vapor Deposition (PVD). The thin layer of Al is substantially devoid of contaminants because the layer is deposited in a vacuum. Oxygen is then introduced and the thin layer of Al is then *in-situ* oxidized such that the thickness of one layer is about ten angstroms. Full oxidation is possible because the metal layer is so thin. The purity of the metal film and full oxidation of the metal contribute to the film comprising a minimal number of pinholes. To provide a suitable gap layer of a desired thickness, a plurality of metal films may be formed by repeating the PVD sputtering and *in-situ* oxidation.

7. I assert that in contrast, Sasaki teaches metal oxide films that are physically very different. In Sasaki, metal oxide films are formed using Low Pressure Chemical Vapor Deposition (LPCVD or CVD). LPCVD involves forming of alumina films, which is aluminum oxide, by a chemical reaction between two gases that are intermittently injected where one gas may be H_2O , N_2O or H_2O_2 ; the other may be $Al(CH_3)_3$ or Al_2Cl_3 . A metal oxide is formed and deposited at substantially the same time. In order to prevent shunting, the thickness of the gap layer taught by Sasaki, is necessarily ten times thicker than that of the claimed invention. The larger size restricts the size of the overall spin-valve sensor.

7. I assert that the films taught by Sasaki necessarily contain contaminants. Metal oxide films, such as those taught by Sasaki, typically also include undesirable chemical elements and other contaminants such as N, Al, or Cl. This is particularly so in light of the fact that there is no teaching or suggestion in Sasaki that the CVD is performed in a vacuum. Such contaminants can cause the gap layer to short.

8. I assert that CVD metal oxide layers taught by Sasaki have a lower oxidation density than PVD oxidized metallic layers of the claimed invention. This results in a much higher possibility that the CVD metal oxide layers will short than the PVD oxidized metal layers of the claimed invention. To prevent shorting, the CVD metal oxides are stacked together, forcing the metal oxide gap layers of Sasaki to be thicker than those of the claimed invention. Consequently, the other layers of the disk drive head are proportionally thicker.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful, false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated this 30th day of September 03.


Tsann Lin